Philosophical Transactions

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An Accompt of two Books.

I. *TRACTS, written by the Honourable* Robert Boyle, *containing New Experiments touching the Relation betwixt* Flame *and* Air, *and about* Exploſions: *An Hydroſtatical Diſcourſe, occaſioned by ſome Objections of Dr.* Henry More, *&c; To which is annex't an Hydroſtatical Letter, about a Way of* Weighing water in water: *New Experiments, of the* Poſitive *or* Relative Levity *of Bodies under water; of the* Air's Spring *on Bodies under water; and about the* Differing Preſſure *of Heavy* Solids *and* Fluids. *London*, 1672. *in* 8°.

IN the firſt of the Tracts, which contains the *New Experiments* about the *Relation betwixt Flame and Air*, the Noble Author, after he had mentioned ſome of the chief difficulties, both in *making* and *judging* of theſe Experiments, and occurred alſo to ſome thoughts, that might ariſe in the Reader, about his not aſcribing in theſe Narratives ſo abſolute and equal a neceſſity of the *Air* to the production and conſervation of all *Flames*, as divers Men have concluded from his former Experiments; after this, *I ſay*, he divides this Diſcourſe into *three* parts. The *firſt* delivers *Nine* Experiments concerning the Difficulty of *producing* Flame without Air; tryed eſpecially upon *Brimſtone*, *Gunpowder*, and *Aurum fulminans*, in *vacuo Boyliano*. The *ſecond*, contains *Six* Experiments touching the Difficulty of *preſerving* Flame without Air in the ſaid *vacuum*; tried upon Mineral bodies already kindled, in order to receive ſome new Informations about the *Diverſities* and ſome other *phænomena* of Flame, and the various *degrees*, wherein the Air is neceſſary or helpful to them. The *third*, furniſhes *five* Experiments of the ſtrangely difficult *Propagation* of *Actual* Flame without the aſſiſting preſence of the Air; tried upon *Spunck*, *Camphire*, *Gunpowder*; which laſt, though fired it ſelf, yet would not fire the contiguous grains in this *Vacuum*, except in one tryal, wherein kindled coals being employed, it is gueſſed, that the Coals acting ſtrongly at the ſame time on the whole extent of the powder that was next to them (in the abſence of the Air,) each grain was in that caſe a kind of a little *Granado*, and the heap of them being uniformly enough acted on by the fire, they were made to go off, as to ſence, all at once, as if there had been but a contemporary *Exploſion* made of them all together by the action of the external fire, rather than any true *Accenſion* made by the flaming grains of the unkindled ones.

To this firſt Tract our Author adds; 1. Some New Experiments about the Relation betwixt *Air* and the *Flamma Vitalis* or Vital Principle of Animals; In the firſt of which Experiments are compar'd the Duration of the Life of an Animal, and of the Flame of Spirit of wine, included in a cloſe veſſel: In the ſecond, is compar'd the Duration of the Life of a Bird with the laſting of a burning Candle or Coal in *Vacuo Boyliano*: In the third, is obſerv'd what happen'd to the Light of Gloworms in the Exhauſted Receiver: In the fourth, the foregoing Tryal is varied and improv'd: In the fifth, the former Inquiry is ſtill further proſecuted: In the ſixth and laſt, 'tis examin'd whether Animals be heavier dead or alive. 2. An Attempt to produce *Living* creatures; and another made upon *Gnats*, in the ſame *vacuum*.

In the *Second* Tract the Author conſidering, that ſome of the Aſſertors of the *Flamma Vitalis* do explicate many of the motions of Animals, eſpecially thoſe perform'd in the Muſcles by the *Exploſions* made of certain juices of the Body, when they come to mingle with each other; as alſo, that the Maintainers of this *Hypotheſis* are found to inſiſt on no other inſtances in favour of it than the going off of Gunpowder: He was induced to ſuſpect, they were not yet provided with better Examples, and therefore thinks, it will not be lookt upon as uſeleſs, if, without offering to determine any thing about the Truth of the Opinion, he ſupply the Embracers of it with ſome Examples of Exploſions made by the bare mingling of Liquors; as one made with the *Spirits* of *Nitre* and *Wine*; another, with *Oyl* of *Vitriol* and *Oyl* of *Turpentine*; a third, by two Bodies actually *Cold*.

The *third* Tract is a Polemical Diſcourſe, anſwering ſome Objections pompouſly propoſed by Dr. *H. More* in his *Enchiridium*

dium Metaphyſicum againſt ſome Explications of New Experiments, made by our Author, and relating to the Gravitation and Preſſure of Fluids. Our Noble Philoſopher than in his Vindication ſtill aſſerts, and with great clearneſs maintains; That, ſuppoſing the World to have been at firſt made and to be continually preſerv'd by Gods divine power and wiſdom; and ſuppoſing his general concourſe to the maintenance of the Laws by him eſtabliſh't in it; the *Phænomena*, he endeavours to explicate, may be ſolv'd *Mechanically*, that is, by the Mechanical affections of Matter, without introducing any precarious Principles, ſuch as he eſteems to be *Nature's Abhorrence of a Vacuum*, *Subſtantial Forms*, or Dr. Mores *Hylarchical Principle*, i.e. (in plainer terms,) his *created Immaterial Director*. But in this Explication, our Author, to make his Diſcourſe the more Inſtructive, occaſionally adds ſeveral Conſiderations and Experiments, for the clearing up and confirming ſome *Hydroſtatical* Truths, that he fears are but by very few aſſented to, or perhaps ſo much as underſtood. Amongſt them, he diſcuſſes at large and ſolves this noble Problem, *Whence it is, that* Urinators *or* Divers *are ſo far from being killed or oppreſſed by the Weight of the incumbent and ambient water, that they are not ſo much as hurt by it.* Concerning which he takes notice, that in this Queſtion 'tis taken for granted, that *Divers*, though at never ſo great a depth, feel no preſſure againſt them by the water; which he ſaith is an affirmation in point of fact, of whoſe truth he makes ſome queſtion, alledging the reaſon why he doth ſo.

To this *Hydroſtatical Diſcourſe* our Author ſubjoins a *Letter*, dilucidating an Experiment of his about a way of *Weighing water in water*, upon the occaſion of ſome Exceptions made to it by Mr. *George Sinclair* in his *Hydroſtaticks* lately printed at *Edinburg*.

Upon which occaſion the Publiſher of theſe Papers finds himſelf obliged to take notice of a Pamphlet annext at the end of this ſame Book of Mr. *Sinclairs*, called, *A Vindication of the Preface of the Book intitul'd*, Georgii Sinclari, *&c. Ars nova & magna Gravitatis & Levitatis, from the challenges and reflexions of the Publiſher of the Phil. Tranſactions, as they are to be found in Numb.* 50, *Aug.* 16, 1669.

Not to reflect, as it deſerves, upon the ſubtle leaving this Pamphlet out of the Copy, that was by Mr. *Sinclair* preſented to Sir *R. Moray*, a perſon whom he knows to be very far from allowing his pretences in the *Preface* here queſtion'd ; the ſaid Publiſher firſt of all deſires the Reader to obſerve, how groſly Mr. *Sinclair* prevaricates in his pretended Vindication, when, alledging the Publiſhers proof, whereby he aſſerts, that the Manuſcript of *Ars nova & magna*, &c. was not committed by the Author to the Judgment of the *R. Society*, he omits the main part thereof, contained in theſe words, *Which* (recording) *is yet their conſtant and careful practice to do in all things of that nature.* For, if this had been taken in by M. *Sinclair*, he muſt certainly have thought, none but ſuch as are wholly ignorant of the Candor and Juſtice of that Illuſtrious Body, and of the care of the ſworn Secretaries thereof, would believe him in what he ſo boldly and immorally aſperſeth them with, viz. *That it was the intereſt of them, who had taken out the purpoſes of his M S, to procure it ſhould not be recorded in the Regiſter* ; Unleſs it ſhould be ſaid (a thing very hard to imagine) that the Regiſtery had been in this only caſe purpoſely omitted at the ſollicitation of the pretended Plagiaries ; which who they be in particular, hath not yet been declar'd by M. *Sinclair* : Who, in the next place, might do well to conſider, not only how much, before his pompous *Ars Nova & Magna* came abroad, had been printed of the Doctrine of the Air's Preſſure, and likewiſe how well was known the Way of Counterpoiſing Air with Quickſilver in Glaſs-tubes ; but alſo, that in this ſo generally Inquiſitive and Experimental Age it not ſeldom comes to paſs, that Learned and Curious Men, proceeding in their Reſearches upon Solid Principles, though they reſide in places far diſtant from one another, and without any mutual communication or knowledge of their reſpective ſtudies, yet happen to light upon and diſcover the ſame things and truths ; as may eaſily be made out by undeniable proofs in the matter of *Curve Lines* found equal to *Straight* ones ; in the *Doctrin of Motion* ; in the *Anatome of Plants*, &c. And having ſaid thus much, if M *Sinclair* do yet perſiſt in the good opinion he hath of himſelf, we ſhall leave him ſtill to feed upon it ; though we think, it may be much ſunk by this time from what ſome of his friends very worthy men and competent Judges of mens habilities, from hence have repreſented unto him; To return then to our Author, He

In the *fourth* Tract endeavours experimentally to ſhew, that, though not only the *Peripatetick* Schools, but the generality of Philoſophers both antient and modern, do as well as the Vulgar, aſcribe the Aſcenſion of Lighter bodies in water to an Internal principle, by them called *Poſitive* Levity; yet we need not admit any ſuch thing for the true and adequate cauſe of the emerſion of wood and ſuch lighter bodies, let go under water.

In the *fifth*, he adds to the Proofs, already given of the Power of the Spring of the Air, ſome of the Operations he hath diſcover'd it to have upon Bodies placed *under water*. In the doing of which he employs two ſorts of Tryals, ſhewing, that a ſmall quantity of incloſed Air may by its preſſure have a conſiderable operation upon bodies cover'd with water, notwithſtanding the interpoſition of the liquor; which Preſſure may be manifeſted, *both* by what it directly and poſitively operates upon bodies under water; *and* by the things that regularly enſue upon the Removal of the incloſed Air, or the weakning of its Spring.

In the *ſixth* and laſt, the Author conſidering that it hath prov'd a great Impediment to mens freely acquieſcing in the Doctrine founded on the *phænomena* of his Phyſico-Mechanical Experiments, that if the Atmoſphere could really exerciſe ſo great a Preſſure, as he aſcribes to it, it would unavoidably oppreſs and cruſh all the bodies expos'd to it; He therefore employs in this Tract divers weighty Conſiderations and remarkable Experiments to remove the force of that plauſible Objection.

II. *Eſperienze intorno á diverſe coſe naturali, & particolarmente à quelle che ci ſon portate dall' Indie; fatte da* Franceſco Redi. *In* Firenze, 1671. *in* 4°.

THis Learned and Obſerving Author, deſirous to examine many Traditions about Natural things, takes occaſion from certain *Snake-ſtones*, deſcribed by *Garcias ab Horto* and others, and by the Portugueſes call'd *Cobra de Cabelo*, found in the head of a certain kind of Serpents of *Indoſtan* and other parts of the Eaſt-Indies, and believed to be a ſure Antidote againſt the Biting or Stinging of venomous animals, when applied to the wound, to which 'tis ſaid it will ſtick very faſt, till it have imbibed the poiſon; which done it will fall off: This being invalidated by the Author upon many Tryals, he affirms to have made with many of ſuch Stones, of divers ſorts and ſizes, and of ſuch as were eſteemed to be moſt genuin, lent him by thoſe very men that had brought them out of *India* themſelves, and were perſuaded of the great efficacy of thoſe very individual Stones; he proceeds thence to the examination of divers other received vertues of things, found by him likewiſe to be fictitious, or at leaſt not anſwering his expectation in the Experiments, himſelf made with them.

Next, he takes notice of ſeveral things, that produce real effects but not always, by reaſon of ſome impediments intervening. E.g. 1. That *Aqua vitæ* ſwims upon Oyl-olive, which it doth, not when 'tis undephlegmed, but when highly rectified. 2. That all natural waters of rivers, ſprings, conduits, &c. have been formerly obſerved by the *Florentin* Academicians to grow turbid upon the Infuſion of water diſtill'd in a Leaden-bell, except the Conduit water of *Piſa*; yet of late this *Piſa*-water grows turbid alſo: of which the reaſon is here inquired into. 3. That waters diſtilled in Glaſs, if mingled with waters diſtilled in Lead, grow not troubled, by the obſervations of the ſame *Florentins*: Whereas this Author affirms, that ſometimes 'tis otherwiſe; he having ſtilled *Parietaria* in a Glaſs ſtill, and ſhifted the Receiver 14 times, and mingl'd all theſe ſhifted waters with Roſe-water diſtill'd in Lead, and yet found them all become turbid; though he often repeated it in ſeveral months. Yet after he diſtilled in *balneò* the remainder of theſe 14 ſhiftings in a Silver-veſſel with a Glaſs-head, changing the Receiver 8 times, he found indeed the water, that was gathered in the eight and laſt Receiver, untroubled, though he mingled it with ſeveral ſhiftings of water ſtilled in Lead, but all the other 7 ſhiftings grew ſtill turbid, when thus mixed. 4. That Cinnamon-water, diſtill'd in Cold, Silver, Glaſs, with a Glaſs-head, and kept in Glaſs, remains

mains always clear,but in Cryſtal of *Piſa* grows turbid in a few *hours*,and then milky,and in few days after, yellow, and at laſt bitter; whereas in Cryſtal of *Rome* and *Venice* it grows not troubled but after 2 or 3 *days*,and never yellow,nor bitter;and in Cryſtal of *Paris* it will ſcarce grow turbid but after a very conſiderable time: Which whether it depend upon the diverſity of the materials, or the different way of preparing the Cryſtal, or both,or upon other cauſes,is here curiouſly diſcuſſed. 5. That Powder made of Niter,Salt of Tartar & Flower of Sulphur, will ſometimes fulminate,ſometimes not. 6.That Oyl of Tobacco kills not all animals,nor diſpatches thoſe which it kills in the ſame ſpace of time. Where he ſpeaks of the great difference,he found between the Tobacco of *Braſil* and that of St.*Chriſtophers* as to this effect: *Varino* and *Braſil*-Tobacco producing almoſt the ſame effect,whereas that of St.*Chriſtophers*,*Terranova*, *Nieve*, St. *Martyn*, have very different effects. 7. That the fiſh *Torpedo* cauſeth ſtupefaction;but to our Author then only,when he held and ſqueeſed it,not at any the leaſt diſtance. The Fiſh he diſſected, to ſee whether he could diſcover the ſeat and cauſe of its ſtupefactive power; and notes,that all that part of it between the gills and head, and the place where the fins are, as far as to the foremoſt extremities of the whole body of it,is taken up by a fibrous,ſoft and very white ſubſtance, the fibres being as big as a big ſwans-quill, and interlaced with nerves and ſanguineous veſſels; and the ends of theſe fibres reaching to and touching the skin of the fiſhe's back and breaſt,ſo that they all united together form two Muſcles of a *falcate* figure, weighing $3\frac{1}{2}$ *lb.* in a fiſh of 15 pound weight, as this was.In which two Muſcles he ſuſpects that benumming force to reſide more than in any other part; obſerving,that that virtue was felt more vigorous, when he took the *Torpedo* and ſqueeſed it in his hand;at which it ſtrove to ſlide away. By the by, he took notice,that the *Iris* of this Fiſhes Eye is of ſuch a figure,that half of it is concave,the other half convex, and that the convex part entring into the concave,the pupill is cloſed.Many other things he obſerved in this Fiſh,which ſee in the Book it ſelf. 8. That certain *Water-nuts* or *Efts* in *Braſil*, *Cuba*, *Mexico*, breed a ſtone in their ſtomach, which being pulveriſed are by *Ximenes* himſelf affirm'd to cure Nephritical pains,and even to break the ſtone. Which

yet

yet being often tried by the Author,had no effect.No more had Eagle-ſtones, famous for facilitating the travel of women; nor ſtones ſwallow'd by *Caymans*,ſaid by *Monardes* to be very powerful in curing Quartans. 9. That the great digeſtive power in Fowl being notorious,he made very many Experiments upon Hens, Ducks, Capons, Pigeons, by cramming into them many Cryſtal-bullets,both hollow and maſſy ones;in which,upon killing & opening thoſe animals, he found many very remarkable changes;too long to be here recited.We ſhall only note thence, that by ſome of his Tryals he ſaw verified that *Florentin* Experiment, by which Glaſs-bullets in the ſtomacks of Hens and Ducks had been found full of a certain white matter like curdled milk; which he thinks comes thither,from being expreſſed out of thoſe innumerable *papillæ* which are ſeated in the inner part of the *æſophagus* of all Fowl, that is faſtned to the upper orifice of the ſtomack. Whence he is inclined to believe, that Digeſtion in the ſtomack of Birds is not fully made by Grinding alone,but that there is required a *Menſtruum* beſides,to ferment,diſſolve,ſubtiliſe,and to convert the meat already ground into Chyle: And he is perſuaded, that the gravel and ſtones, ſwallow'd by Fowl,and ſtir'd about by the Muſcles,perform the office of Teeth.

To theſe he adds ſome Tryals made by himſelf with the famous *Glaſs-drops*,which,when *temper'd in water*, and crammed into Ducks and Capons, were after many days found intire in their ſtomack,though afterwards they flew in pieces,as they are wont to do,the tail of them being broke off. Two alſo of the ſame kind being weighed and given to a Capon to ſwallow, were after 30 days taken out ſound,but weighed leſs between 2 and 3 grains. But having *un-temper'd* (*ſtemperato*) or taken off the temper with *fire*,of one of theſe Drops,weighing three penny weight,and crammed it into a Capon,he found it had loſt 4 grains in 4 days; and being given to ſuch another Fowl, he found, it had,in 6 days more,loſt 9 grains: An Argument, he ſaith, that thoſe Drops are much harder when temper'd in water, than when un-temper'd with fire.

He likewiſe tryed ſmall *Diamonds*,*Topazes*,*Leaden-bullets*,*Bohemian Jaſper*,*Porphyr*; and found, the firſt had loſt nothing at all of their weight in the ſtomack of a Duck;the ſecond,almoſt nothing; the third, had loſt conſiderably in the ſtomack of Hens; the fourth and fifth, nothing at all, after many days, in the ſtomack of Hens, Ducks, Turky-cocks. Four *Pearls*, which all of them altogether weighed 12 grains, loſt 4 grains in the ſtomack of a pigeon in 20 hours; and 8 other pearls, weighing together 30 grains, loſt, in the ſtomack of another pigeon, 20 gr. in two days.

Having done with this ſort of Obſervations, he goes on to recite more relations about other vertues aſcribed to divers other Natural things; As, that the Blood of a *Rhinoceros* doth marvels in curing the Colick, and in ſtopping the Bloody flux; and the Decoction of the skin of the ſame is very ſtomachical; and the Horns of it very Antidotal. All which he found groundleſs in his frequent Tryals.

Hence he proceeds to diſcourſe of the Horns of Staggs and other Deer, and obſerves, after others, *that* Staggs put forth their firſt Horns the ſecond year of their age: *That* they caſt them every year a little after the beginning of March; *That* thoſe that are well-fed and luſty, caſt them off firſt, the lean ones ſtay longer, ſometimes till the end of April: *That* theſe Horns are faſtned to the bones of the skull, not to the skin only, as ſome ſay: *That* 8 or 10 days after they are caſt, new ones bud forth, which are hairy, growing hard in about 3 months, at which time the Stagg rubs off the hairy skin: *That* the branches of theſe Horns are more or leſs in number according to the Age of the Staggs, and the ſeveral Countries wherein they live, the oldeſt of them in *Tuſcany* having but 6 or 7, and very ſeldom 8 or 9 on one horn, but in *Germany*, and above all in *Saxony*, 14 or 15, and ſometimes more: *That* a young horn, yet tender, if cut, eſpecially at the bottom, emits blood in ſtreams & ſo violently, that the Stagg often dyes of it: *That* this blood coagulates like the other blood of the Stag, that comes out of the veins or arteries; though this be denied by *Ariſtotle* and *Galen*; ſanguineous veſſels being diffus'd through all the Horns when tender, for the conveyance of ſufficient nouriſhment; though by little and little they are dried up: *That* a Hart being caſtrated whilſt young and before it puts forth his Horns, never gets any; if gueld when horn'd, he never caſts them, but keeps thoſe always he had when he was cut.

After

After this diſcourſe,he examins what is related of a certain Spice, called *Pimienta di Ciapa*, which *Ciapa* is a province of *Guatimala* in New Spain; and eſteems that Spice to be the ſame with what *Hernandez* deſcribes under the name of *Xocoxochitle*, or *Pepe di Tavaſco*: which by his deſcription ſeems to be the very ſame with our *Jamaica-pepper*,it having thoſe ſeveral taſts of Cloves,Pepper,Cinamon,Ginger. Mean time the virtue,for which it is by writers commended, againſt the Epilepſy and the *Gutta ſerena*, he ſaith he could never find in it, though he acknowledg it to be a good Cephalic,and very Stomachical.

Next,he ſpeaks of the praiſes given to *China-fennel* againſt many infirmities,though he found it little better than the European Fennel, Annis,and Cumin. What *Ximenes* relates of the chips of *Saſſafras*,that, being kept 7 or 8 days in Sea-water, they make it freſh and potable, he was not ſo happy to find true, though he kept Saſſafras thin ſliced, in conſiderable quantity,infuſed 20 days in a ſmall proportion of Sea-water. What is written of the Root *John Lopez Pineiro*, growing in *Zanguebar* in Africa,and of the Root *Della Manique*,both commended for their virtue of Infallibly curing Tertians and Quartans, and the bitings and ſtingings of venomous animals, he had neither the good fortune to diſcover. Further,what is recorded of the ſhrub of *Cheggio*, a lacteſcent plant, found in *Cambaja*, that the knobs and beards of it, that look Nord-ward,are only Anti-apoplectical,but thoſe that look South-ward, are ſo far from being endow'd with that virtue, that they are poiſonous and deadly; he could not find to anſwer his Tryals: Neither could he find any great matter in the celebrated wood of *Calamba*,nor the *Vanillas*, nor the wood of *Lahor* and *Solor*. But he muſt acknowledge the virtue of the Bark of the *Peruian* Tree in *Guajachil*, known by the name of *China di China*, curing Quartans and all ſorts of Tertians. He wiſheth, it were as true, what is recorded in the praiſe of thoſe two Herbs of China,called *Puſu* and *Gudſeng*, whereof the former is ſaid to render men Immortal,the other,to preſerve them always in good health.

He cannot believe what *Martinius* in his *Atlas* relates of certain Fiery Pits in *China*, able to dreſs any meat in them, and uncapable to conſume wood: *Nor* what is written of the two Rivers, *Chiemo* and *Io*,in the province of *Xenſi*,the waters of which are ſaid to be ſo pure and light,that the lighteſt ſtraw ſinks in them: Nor that the Leaves of certain Trees are metamorphos'd into Swallows;nor laſtly,that in the Seas of *China* there are certain ſcaly Fiſhes of a Saffron-colour,which in winter live in the water,but in ſpring caſt their ſcales,get feathers and wings,and ſo fly a ſhore into the woods,and their live all ſummer and autumn,but then return to their former ſhape and betake themſelves again to the habitation of the Sea.

Errata left un-corrected in N. 90.

In the Dedication p.ult.l.8. for *Rhine* r. *Rhone*. p.5166.l.32.r.*above it*. p.5167.l.7. r. *what the other*. p.5168.l.27. r. *than is ordinarily accountable for*.

Errat. in this *Numb.* Pag.5177.l.9. in the margin r.*diminut*.

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